

## CLAIMS

What is claimed is:

1. A rotary impeller for a tailings conveyor of an agricultural combine, for threshing tailings and propelling the tailings through a portion of the conveyor, the impeller comprising:
  - a mounting portion mountable to a rotatable member of the conveyor for rotation therewith in a predetermined rotational direction about a rotational axis;
  - a plurality of blades extending generally radially outwardly from the mounting portion, each of the blades including a surface facing in the rotational direction including a radially outermost threshing portion for threshing the tailings and propelling the tailings in the rotational direction through the portion of the conveyor, and a tailings deflecting portion disposed between the threshing portion and the mounting portion, the tailings deflecting portion having a convex shape for deflecting tailings contacted thereby during the rotation in a radially outward direction into a rotational path of the threshing portion for threshing and propelling in the rotational direction thereby through the portion of the conveyor.
2. The impeller of claim 1, wherein the threshing portion of the surface of each blade is swept back relative to the rotational direction at about a 30° angle to a radial innermost portion of the surface disposed between the deflecting portion and the mounting element.
3. The impeller of claim 1, wherein the radially outermost portions of the blades each have a predetermined extent in the direction of rotation greater than an extent in the rotational direction of the deflecting portions of the blades, respectively, so as to be capable of wearing away by an amount only

marginally less than the predetermined extent while substantially maintaining an original radial extent of the blades.

4. The impeller of claim 1, wherein the deflecting portion will lead the threshing portion as the impeller is rotated in the rotational direction, such that at least some of the tailings deflected by the deflecting portion will be deflected radially outwardly forwardly of the threshing portion.
5. The impeller of claim 1, including four of the blades located at equally angularly spaced locations around the mounting portion.
6. The impeller of claim 1, further comprising webs connecting adjacent ones of the blades adjacent to the mounting portion, for limiting axial movement of the tailings during the rotation of the impeller.
7. The impeller of claim 1, wherein the threshing portion of each of the blades is swept back in the rotational direction relative to the deflecting portion so as to define a threshing space radially outwardly of the deflecting portion and forwardly of the threshing portion in the rotational direction, wherein elements of the tailings will be threshed by being propelled by the blade into one another and against an adjacent radially inwardly facing surface of a housing of the conveyor.
8. The impeller of claim 7, wherein the swept back threshing portions of the blades each have a radial extent so as to be located in predetermined closely radially spaced relation to a radially inwardly facing surface of the portion of the conveyor for limiting passage of the tailings between the threshing portions and the inwardly facing surface, and such that after passing the

inwardly facing surface the threshing portions of the blades will accelerate and propel the tailings radially into another portion of the conveyor.

9. The impeller of claim 1 wherein the radially outermost threshing portion of the surface of each of the blades is at least substantially flat, and each of the blades includes a radially outermost tip portion which has a predetermined extent in the rotational direction which is greater than an extent of other portions of the blade in the rotational direction such that the threshing portion of the surface can abrade away by an amount up just less than the predetermined extent while the radial extent of the blade remains substantially constant.
10. A rotary impeller for a tailings conveyor of an agricultural combine, rotatable in closely spaced relation to an inner surface portion of a housing of the conveyor for propelling tailings through at least a portion of the conveyor while at least partially threshing the tailings, comprising:
  - a hub mountable to a rotatable element for rotation therewith in the housing in a predetermined rotational direction about a rotational axis;
  - a plurality of impeller blades extending radially outwardly relative to the hub at predetermined spaced locations around the rotational axis, each of the blades having a swept back shape in the rotational direction including a radial inner portion extending generally from the hub to a tailings deflecting portion including a deflecting surface facing in the rotational direction, and a radial outer portion extending generally from the deflecting portion to a radially outermost tip portion of the blade at an acute angle to the radial inner portion, the radial outer portion including a tailings threshing surface facing in the rotational direction, such that as the impeller is rotated in the housing the deflecting surface will contact the tailings and deflect the tailings radially outwardly into an area in front of the threshing surface so as to be propelled

and accelerated thereby in the rotational direction through the housing and threshed by contact with other tailings and the inner surface of the housing and the threshing surface.

11. The impeller of claim 10 wherein each of the blades has a predetermined radial extent from the rotational axis to the radial outermost tip portion such that the tip portion will be spaced a predetermined distance from the inner surface portion of the housing during the rotation, and the radially outermost tip portion has a predetermined extent in the rotational direction such that the threshing surface can wear away by an amount up just less than the predetermined extent while the radial extent of the blade remains substantially constant..
12. The impeller of claim 10 wherein the radial outer portion of each of the blades is oriented at about a 30 degree angle to the radial inner portion of the blade.
13. A tailings impeller for rotation in closely spaced relation to an inner surface portion of a tailings conveyor housing for propelling tailings through the housing and threshing the tailings the tailings in cooperation with the inner surface portion, comprising:
  - a hub mountable to a rotatable element for rotation therewith in the housing in a predetermined rotational direction about a rotational axis;
  - a plurality of impeller blades connected to the hub and extending radially outwardly therefrom at predetermined spaced locations around the rotational axis, each of the blades having a radial inner portion extending from the hub to a tailings deflecting portion including a deflecting surface facing in the rotational direction, and a radial outer portion extending radially outwardly from the deflecting portion in swept back relation thereto in the rotational direction, the radially outer portion including a tailings threshing

surface facing in the rotational direction oriented at an acute angle to the radial inner portion, such that as the impeller is rotated in the rotational direction the deflecting surface will deflect tailings coming in contact therewith radially outwardly into an area forwardly of the threshing surface in the rotational direction and guide tailings radially outwardly along the blade to the threshing surface so as to be propelled thereby in the rotational direction through the housing and threshed by randomly colliding with other tailings and contacting the inner surface portion of the housing and the threshing surface.

14. The impeller of claim 13 wherein each of the blades has a predetermined radial extent from the rotational axis to a radial outermost tip portion of the blade such that the tip portion will be spaced a predetermined distance from the inner surface portion of the housing during the rotation, and the radially outermost tip portion has a predetermined extent in the rotational direction such that the threshing surface can wear away by an amount up just less than the predetermined extent while the radial extent of the blade remains substantially constant..
15. The impeller of claim 13 wherein the radial outer portion of each of the blades is oriented at about a 30 degree angle to the radial inner portion of the blade.